

Research, Engineering & Development Advisory Committee (REDAC)
Federal Aviation Administration
April 20, 2011
Meeting Minutes

On Wednesday, April 20, 2011, the Federal Aviation Administration (FAA) Research, Engineering and Development Advisory Committee (REDAC) held a meeting in the Round Room, at FAA National Headquarters Building at 800 Independence Avenue, SW, Washington, DC. The purpose of the meeting was to provide recommendations on the FAA FY 2013 R&D portfolio. Attachment 1 provides the meeting attendance; attachment 2 provides the agenda.

Welcome and Introductory Remarks

Mr. Paul Fontaine, REDAC Executive Director, read the public meeting announcement and thanked everyone for attending.

Dr. John Hansman, REDAC Chair, welcomed everyone and commented that FAA Administrator Randy Babbitt had been scheduled to appear but was currently out in the field. Deputy Administrator Michael Huerta would be attending. Dr. Hansman then opened the floor to any questions or comments.

Mr. Fontaine stated that after reading through the draft subcommittees' recommendations, he noted a common thread of distress over the decreasing R&D budgets facing the FAA. He went on to comment that the FAA had been fortunate in the past to enjoy many years of increasing budgets but that now, limited budgets called for difficult decisions to be made. Mr. Fontaine reminded those gathered that this declining budget environment was a national reality and that they should be prepared for the trend to continue into the foreseeable future. For FY 2011, the mandatory R,E,&D budget reduction amounted to \$20 million, which was far less of a reduction than that imposed upon the Facilities and Equipment (F&E) budget. Therefore, Mr. Fontaine continued, the proper alignment and prioritization of the FAA's R,E&D portfolio was paramount, and the teams would have to demonstrate flexibility and agility when making budget decisions. He urged the teams to adjust to the reality that, unlike in prior years, not everything could be funded and certain programs would have to be stretched out, descoped, or closed down. Mr. Fontaine stated that he wanted to impress upon the Research and Development Executive Board (REB) and the REDAC that now was a time to create balance across all of the priorities of the FAA.

Dr. Hansman agreed, and stated that each subcommittee needed to be mindful of how it lobbied for increased budgets. Very strong cases would have to be made to secure additional funding. He acknowledged that continuity of capability was of great concern to the group and that this would need to be considered and discussed when allocating the budget. Mr. Fontaine agreed and added that the group needed to be more strategic about looking at work going forward and interjecting, for example, human factors dimensions into projects. The key management challenge to this REDAC team was to better align and leverage all of the functional areas of the FAA.

After Dr. Hansman asked if anyone had any questions or comments and no one did, the group moved on to the next agenda item.

Dynamics of Change Working Group Update

Dr. John Hansman and Mr. John Wiley (FAA Designated Federal Official for the Change Working Group) provided an update on the working group. Mr. Wiley explained that it was formed about a year ago at the request of Vicki Cox due to concerns about cultural issues that could be obstacles in implementing NextGen. The group was tasked with identifying actions that the FAA could take during the implementation of NextGen to mitigate cultural problems.

Mr. Wiley explained that most of the work done so far centered on taking the goals and requirements of NextGen, parsing them into pieces, and then comparing these pieces to similar groups in the industry. The discussions had revealed interesting idiosyncrasies and non-technical issues that had been arising as a result of NextGen. The group was reaching out to industry partners to gain insight from their “lessons learned” and was working on outlining what could be done to mitigate the risks to the FAA going forward. A final report was scheduled to be delivered to the REDAC in September 2011.

Mr. Fontaine asked if the results of this effort could be delivered sooner than originally planned due to some current changes at the FAA. He stated that another study seeking to identify the optimal structure for delivering NextGen had been taking place for a year and the results of the working group could be used to complement this study. Mr. Wiley stated that the main analysis would be completed in the June/July timeframe and that therefore the group did not currently have any recommendations or findings to pass along. In response to Mr. Wiley’s presentation, Dr. Amy Pritchett stated that the list of FAA stakeholders working with the group was impressive and asked if the group was planning to tap into any further discussions with non-FAA stakeholders. Mr. Wiley replied yes and explained that additional stakeholder discussions would be conducted in May. However, he cautioned the REDAC to remember that the group wanted to identify people or industry groups who had faced or had feedback on relevant and specific issues. Dr. Hansman repeated that the intent of the working group was not to talk to a mass of stakeholders but rather to develop mitigation strategies for NextGen performers to execute to normalize expectations.

Budget Update

Mr. Mike Gallivan provided a budget update to the REDAC. His briefing began with a history of annual R&D appropriations (including what was requested for 2012). Mr. Gallivan drew the group’s attention to the fact that historically, the RE&D appropriations had gone up and down, with a significant drop in 1999 (when Congress moved various budget line items (BLIs) from the RE&D to the F&E appropriation). There was also a drop between 1992 and 1994 because during that time, the security aspect of the RE&D budget (including the Federal Air Marshal Service) was moved from under the FAA to the Transportation Security Administration. Additionally, the Center for Advanced Aviation System Development (CAASD) was also moved out of the RE&D umbrella to become a full F&E appropriation. Mr. Gallivan continued that for

FY 2011, the appropriation had decreased from the requested \$190 million level to \$170 million, based on discussions between the President and Speaker of the House.

Mr. Gallivan explained that the majority of the FAA appropriation goes to Operations (Ops) to pay controllers, etc. The RE&D portion of the appropriation has stayed at a fairly consistent percentage of 1% from year to year. While the Ops budget includes money for R&D purposes, it is earmarked exclusively for commercial space research. The Airport Improvement Program (AIP) budget also has its own R&D budget. Mr. Chris Oswald asked if that appropriation included funds for the Airport Cooperative Research Program (ACRP) and Mr. Gallivan relied yes.

Mr. Gallivan explained that the continuing appropriation had been granted at the \$170 million level (which was a \$20 million reduction from the requested funding level) minus a \$340k rescission. This decision had been made on Friday and the REB was working on coming to a consensus regarding where to make budget cuts. Mr. Gallivan stated that a significant amount of the budget cuts would be taken out of NextGen funding. The REB was trying to coordinate R,E&D cuts with budget cut decisions being made for F&E.

For the FY 2012 budget, Mr. Gallivan cautioned that, although it had been submitted to Congress with a \$190 million funding request, it might ultimately be funded at the FY 2008 level, which would lead to even more extensive R,E&D budget cuts.

While the original NextGen funding request was for \$77 million, the final approved appropriation could be significantly lower. Mr. Fontaine said that the Administration's priorities were 1) to fund current operations first and then 2) to fund NextGen; and within those parameters, to prioritize programs based on what was already underway (vs. programs which would be considered new starts).

Mr. Gallivan reviewed the outyear funding by appropriation type. He explained that FY 2012 budgets had already been submitted and that FY 2013 was still being worked. In terms of the R,E&D budget, Mr. Gallivan noted the \$7 million reduction between FY 2012 and FY 2013 and pointed out that the funding request numbers were on a downward trend.

Mr. Gallivan explained that the FAA's reauthorization was on its 18th extension. The good news was that both the House and the Senate had passed a version of the reauthorization bill; however, the bad news was that the two bills were different.

Mr. Oswald asked if the House bill dealt with the ACRP funding being moved from the AIP appropriation to under the RE&D appropriation and asked how this would impact the overall program. Mr. Gallivan replied that the FAA had started thinking about our response should it happened, but would wait to see how the issue played out before making a final decision.

Remarks by Deputy Administrator Michael Huerta

Mr. Michael Huerta thanked everyone for being there and apologized for Administrator Babbitt's inability to address the group as originally scheduled. He explained that the Administrator was

out in the field meeting with staff at air traffic control facilities having frank conversations with the workforce on safety, and professionalism.

Mr. Huerta went on to acknowledge that the budget was very much on everyone's mind and shared his views on the topic. In the grand scheme of things the FAA fared better than other agencies even though we received significantly less funds than originally requested. He added that the pain of the budget cuts forced upon the Administration was further compounded by the fact that Congress took so long to make a decision (this complicated and, in some cases, negatively affected the execution of projects). He stated that establishing priorities had become very important as a result of these budget cuts. The FAA did, however, receive some relief in the Operations appropriation to fund changes in controller staffing and pay which had previously been negotiated. Mr. Huerta stated his belief that a very challenging budget environment lay ahead and his biggest concern was that these current issues were just a warm-up for issues to come in FY 2012. Mr. Huerta said that the President had specifically asked for a large investment in NextGen; however, the expectation was that FY 2012 would continue to be a tough funding environment and there was no expectation of adding any money to the budget. Since the FAA was operating in such a constrained environment, Mr. Huerta appealed to the REDAC members for their information, feedback, and advice on how to properly prioritize and strategize for the future. On the larger question of authorization, Mr. Huerta felt that Congress would most likely pass an authorization bill with significantly reduced funding for the FAA. He reminded everyone that while people at large understand how important aviation is to the economy, it was of paramount importance for the FAA to have a focused discussion of its needs and priorities in order to secure proper funding.

Dr. Hansman presented Mr. Huerta with a synopsis of how the REDAC operates and discussed the following areas of concern.

- 1) FAA workforce technical capability (e.g., software & digital systems).
- 2) NextGen plan complexity (need for high level R&D plan and clear, well-articulated goals; Enterprise Architecture complexity).
- 3) Budget impacts on R&D continuity.

Dr. Hansman stated that the REDAC was ready and willing to advise the Administrator on any technical issues.

Mr. Huerta made some further comments regarding the FAA's technical capabilities; he stated that FAA senior leadership saw this as a significant issue and concern as well. He assured the group that they were giving a lot of thought on how to build and strengthen those capabilities within FAA. Mr. Huerta reminded those present that his background was in software and that he felt that private industry got it right in terms of putting enough money into R&D in order to stay at the cutting edge of technology. He stated that he was impressed with how many technically sound people worked within the agency, but that it was sometimes hard to find these people. This begged an organizational question on how to give technical people proper support and weight within the organization so that things could be accomplished correctly and efficiently.

Mr. Huerta also commented that the FAA is a very linear organization. Introducing complex technologies over a long-term, extended timeframe raises the question of the Administration's level of comfort in managing in the face of uncertainty. The FAA likes to operate in certainty and consistently wants more data, more studies, etc. Mr. Huerta felt that the FAA should learn to operate in uncertainty and get to a point where decisions could be made and feedback mechanisms be adjusted in real-time. He stated that senior management was looking at this from both an institutional and a process standpoint and additionally, wanted to make some organizational moves to address the complexity of NextGen. Dr. Hansman asked Mr. Huerta how he envisioned being able to take the results of research and feed them back into the process in order to inform FAA processes and decisions. He added that this was difficult to do successfully and that you can't always have answers to everything. Mr. Huerta reiterated that he was looking to this group, amongst others, for ideas on how best to accomplish this. Dr. Hansman again stated that the REDAC's job is to provide FAA senior leadership with a scientific basis with which to make those decisions. However, in terms of recent events, it would be hard for the REDAC to sufficiently inform FAA administration in time, since they would need to react very quickly.

Subcommittee Report – NAS Operations Subcommittee

Dr. Steve Bussolari (Acting Subcommittee Chair - filling in for Dr. Victor Lebacqz) stated the NAS Ops Subcommittee held a meeting in March and the group was encouraged by Mr. Fontaine's presentation on the Acquisition Management System. The AJP-66 presentations were very well received and all were happy with how the research was being conducted. Dr. Hansman stated that after reading through the subcommittee's findings and recommendations, he didn't have a clear idea on what they were recommending in terms of public/private partnerships. Dr. Bussolari explained that the subcommittee was recommending that the FAA make more use of and better leverage public/private partnerships for NextGen implementation. He added that they did not have any specific recommendation for a partnership. Dr. Hansman stated that it was still unclear what would be the result of this type of partnership. Mr. Fontaine stated that the FAA did in fact have partnership agreements in place but he sensed that the subcommittee wanted something bigger. Mr. Dan Elwell, from the Aerospace Industries Association (AIA), said that the subcommittee's recommendation had certain relevance because it called to mind the language in various House and Senate directives encouraging the use of public/private partnerships for equipage (though not necessarily for infrastructure). Dr. Hansman still wanted further information on what these partnerships would accomplish. John McCarthy said that the general feeling was that the FAA was not getting enough use out of its current partnerships.

Dr. Hansman then suggested that the subcommittee could tie to its recommendation to either getting a capability the FAA doesn't already have or getting financial buy-in from an outside group through the use of the partnership;

Mr. Fontaine felt that the FAA had some partnerships were in fact focused on R&D and that these were informing the process at the FAA and leading to changes and support of the R&D being performed. He went on to ask the subcommittee to more clearly articulate their goal and recommendations.

Dr. Bussolari then talked about the subcommittee's concerns on how well workforce roles were being designed and explained with the NextGen framework. Senior Vice President Vicki Cox asked him to elaborate on the issues with workforce roles. Dr. Bussolari cited some examples, and while Ms. Cox did not agree with his points, she did feel that recent events had created an opportunity to make things better. Ms. Cox said it was important to engage the workforce early in the process of making NextGen changes and that the FAA has been doing so. She acknowledged that feedback had been strong in the area of Staffed NextGen Towers (SNT) and that the administration was happy to get this feedback. However, there were also many unfounded fears or urban legends about air traffic control towers being torn down, etc. Mr. Fontaine added that there had been strong interest on the part of the National Air Traffic Controllers Association (NATCA) to participate in NextGen trials and human-in-the-loop (HITL) exercises for SNT, etc. He added that the FAA had solicited and continued to receive feedback for that future environment. Dr. Hansman stated that part of the confusion surrounding the FAA's NextGen efforts could be traced back to the complexity of understanding NextGen in general.

The group then engaged in a discussion about mixed equipage and agreed that NextGen needed to consider and address this (i.e., what is the strategy for mixed equipage in the NextGen environment?). Mr. Steve Alterman stated that it was important to identify what R&D needed to be done in terms of understanding mixed equipage. Dr. Hansman added that a further consideration would be if mixed equipage would add to workload in terms of human factor issues. Mr. Alterman continued by asking whether this was being articulated in the R&D. Dr. Bussolari stated that the subcommittee's discussion had revealed that there didn't seem to be a uniform treatment of mixed equipage across all research projects presented to the subcommittee at their REDAC subcommittee meeting. They felt that mixed equipage concerns should already be incorporated into every HITL, etc., but that this wasn't the case. Ms. Cox asked if the subcommittee wanted more research on how this mixed equipage issue was being handled. Dr. Bussolari answered that the NextGen R&D plan needed to address this issue explicitly because mixed equipage was an area of concern. He added that there should be some baseline model of mixed equipage which would be used consistently on the NextGen timeline. Ms. Cox said she would like recommendations from the committee on what this mixed equipage research should look like. Dr. Bussolari said that the subcommittee would address Ms. Cox's request at their next meeting. Ms. Cox said this would be very helpful as senior management struggled with this issue in particular.

Dr. Bussolari went on to say that the subcommittee was very impressed with the System-Wide Airspace Concepts (SWAC) model and its progress. Their recommendation was that this model be used more widely and more proactively, as it was a very valuable tool. In terms of NextGen Weather, the subcommittee was pleased with the strong connection and collaboration between the National Weather Service and the FAA. In terms of the Weather-Technology-in-the-Cockpit (WTIC) program, there was active discussion within the subcommittee regarding which exact problem within the NextGen environment this program was trying to solve. The subcommittee sought better definition of the problem (i.e., what can't you do if pilots don't have this technology, etc.). Mr. Fontaine answered that the FAA was looking to 'sharpen the story' on what they were trying to accomplish there and that further explanation would follow.

Dr. Bussolari then discussed Multifunction Phased Array (in which FAA is one of the stakeholders). The subcommittee felt this technology could be a cost-effective way to replace the current radar system but stressed that the FAA would have to coordinate with industry to make this technology a reality. In terms of human factors (HF), the subcommittee felt it was hard to see the relationship between the HF research projects and the overall movement towards NextGen. Dr. Bussolari then stated that the subcommittee wondered about the status of the JPDO and what role it would have in the future (would it undertake detailed coordination amongst multiple agencies?). Ms. Cox answered that the JPDO would work across agencies and leverage work going on in the future. She said that the JPDO was doing good work in the arena of weather, for example, where they were defining requirements for the near- and far-term. Ms. Cox went on to say that the success of the weather program would lie in getting the Office of Management and Budget (OMB) to put weather R&D into multiple budgets. A challenge was that Congress had clearly defined the role of the JPDO within the FAA but had not done so in other agencies. Ms. Cox said there was also multiagency interest in Unmanned Aircraft Systems (UAS) and that maybe that would fall under the auspices of the JPDO. Mr. Fontaine said that they needed to figure out how to align and leverage the budgets of the Department of Defense, the FAA, and National Aeronautics and Space Administration (NASA) for UAS research and make the UAS a cross-agency initiative.

NAV Lean Update

Mr. John Hickey provided an update on the NAV Lean Implementation to the REDAC. The goal of NAV Lean is to streamline all navigation procedures and to eliminate waste and duplication. The team delivered a series of recommendations to upper management at the FAA and will now work on developing an implementation plan. Mr. Hickey gave the example that if they engaged with an airline; they wanted to make sure that the airline's efforts were rewarded with a positive return-on-investment (i.e., the NAV Lean team would not want to develop a procedure in which the airlines would not invest). The group will outline or map out the process (as it is being carried out today) from beginning to end and will identify area of waste and/or duplication. Mr. Hickey explained that an executive level steering group monitored the team to assure that they stay focused and on topic.

Mr. Hickey stated that now that the team's recommendations were released, a different team was formed to work on the implementation plan. The implementation team was made up of representatives from the home organizations to create the sense of ownership and buy-in needed for the process to succeed. The implementation plan, due in June, will identify specific actions and milestones needed to carry out the team's original recommendations. Mr. Hickey said he welcomed any feedback the REDAC committee may have, even though a formal public comment session would not be held. He wanted to draw the REDAC's attention to the most important metric: that the anticipated time and cost savings of the NAV Lean plan would be 40-50% after implementation. Mr. Hickey felt strongly that this level of savings would meet the RTCA Task Force 5 (TF5) challenging recommendation to start streamlining various processes. He added that he was concerned about budget constraints for FY 2012 and FY 2013, but that the NAV Lean team's efforts would remain a very strong priority in NextGen even if milestones would ultimately need to be pushed out due to these budget constraints. COL Jack Blackhurst

referred to a metric that Mr. Hickey gave during his presentation and asked if the previous Instrument Flight Procedures (IFP) process took three years, what was the timeline now? Mr. Hickey stated that the time could be reduced down to 1.5 or 1.75 years. Dr. Hansman asked if the NAV Lean team had identified other places within the TF5 areas that could be improved and streamlined by applying the same Lean process. Mr. Hickey said that the Lean process was very valuable and that while the team had thought about applying it to other areas, they wanted to implement the NAV Lean changes first to assure that everything would work as predicted before adapting it to other areas. Dr. Hansman went on to say that while IFP lends itself well to the Lean process, some other process issues might be ‘one-offs’ where the Lean process simply might not apply. Mr. Hickey agreed and explained that there were other tools that might apply best to other areas within the FAA that needed to be streamlined.

Mr. Hickey continued by discussing target levels of safety and explained that these needed to be better defined, especially since the current aviation system was so safe. He stated that ‘ten to the minus nine’ could not be used as a target for everything and that this safety level simply could not be adapted to NextGen. Dr. Pritchett asked if there was any existing research around innovative methods of measuring safety. Mr. Hickey was not aware of any but stated that there was specific research and analysis being performed with MITRE, for example, to improve the understanding of how safe things need to be (i.e. identify target levels of safety). He went on to say that the team did not want to employ extensive resources to achieve an ultimate solution when each airport could have some variation in what is safe, etc. Dr. Pritchett advised that the team should implement on-going longitudinal studies to make sure that things REMAIN safe as recommendations are implemented (i.e. that the team doesn’t just make an operational decision at the beginning that something is safe and then never revisit it). Mr. Hickey assured her that the team was taking a step-by-step approach and was not issuing a glut of procedures all at once and just letting them go. Implementation would be done piece by piece, feedback would be solicited on an on-going basis, and implementation would be adapted according to this feedback. Mr. Hickey continued by saying that rather than striving for perfection (which would take too much time, too many resources, etc.), good solutions could be tailored as needed. Overall, Mr. Hickey continued, there was a consensus at the FAA that today’s level of safety is adequate and appropriate.

Mr. Alterman stated that since the NAV Lean team had reviewed the process for evaluating something as safe, it might be useful to leverage the team’s experience and momentum going forward. Mr. Hickey warned that FAA culture dictated that many people don’t want to change the way they do things. However, he went on to say that he thought that the implementation of the recommendations garnered from the Lean process would be successful and that change was afoot at the FAA. He further agreed that the entire workforce needed to start carefully looking at all processes to decide if they are being performed and used as efficiently and effectively as possible.

Subcommittee Report - Airports Subcommittee

Mr. Ed Gervais (Subcommittee Chair) presented the Airports Subcommittee findings and recommendations. A critical area of concern for this subcommittee was the potential realignment of the ACRP and Airport Technology Research Program (ATRP) budgets from the

AIP appropriation to the R,E&D appropriation due to proposed legislation. Mr. Gervais explained that both programs had suffered funding cuts in the past and that moving them under the R,E&D appropriation would have extremely negative consequences. The subcommittee felt it was critical that both programs stay under the AIP appropriation and noted that it was difficult to make decisions about future endeavors without knowing the final budget numbers. There was a great concern that 1) many crucial projects could not be started or completed due to potential lack of funds or cuts to funding, and 2) that the programs may also have to discontinue some on-going projects.

Mr. Mike O'Donnell then discussed how crucial it was to fund valuable R&D projects at airports by citing the example of an aircraft overrun in West Virginia. He explained that had that accident occurred without the installation of the soft ground arrestor funded by AIP R&D funds, 34 people could have died.

Mr. Gallivan then asked Mr. Elliott Black what was happening on the budget side for AIP. Mr. Black explained that on the AIP side, they were required to have an appropriation and a valid authorization to actually receive and then spend federal money. Currently, he continued, programs under the AIP appropriation could only spend their allotted funding (prorated) through the end of May, which is when the FAA's current reauthorization runs out. He added that the current proposed authorization legislation is actually setting certain BLIs for the AIP group, whereas it used to be that AIP doled out the money as they saw fit. This change would hurt the chances of some new starts and of continuing some current projects. Dr. Hansman asked how much of the prorated \$15 million FY 2011 AIP budget had already been spent. Mr. Black did not know but said he could find out; he added that because of the current constraints due to the pending reauthorization bill, the AIP had already been forced to start cancelling programs. Dr. Hansman reminded the group that it was not effective for the advisory committee to simply advise the FAA that more money is needed. Rather, he asked the members to give advice as to how the FAA could best prioritize those projects that NEEDED to be done vs. projects that would be good to do. Mr. Gervais commented that the subcommittee was suffering from poor timing since, at the time of their meeting, they had not been aware that the FY 2011 funding would not go through. Mr. Fontaine commented that while most AIP research was very unique, there were some areas of opportunity to coordinate with what was happening across other areas of the FAA (e.g., surface-moving maps) to get a greater bang for the buck. Mr. O'Donnell stated that the AIP had in fact worked with other groups in the FAA on certain maps but that some maps were unique to the AIP operation and could not be studied in conjunction with other on-going FAA efforts.

Subcommittee Report - Environment & Energy Subcommittee

Mr. Steve Alterman (Subcommittee Chair) presented the findings and recommendations for the Environment and Energy Subcommittee. He stated that his subcommittee had grappled with the budget crisis as well. In positive developments, the subcommittee felt that cooperation between the FAA and the Environmental Protection Agency and the FAA and NASA had been very good and that maybe this would mean that some budget shortfalls on the FAA side could be made up using these other organizations' budgets. However, the overarching recommendation was not to defer research due to budget constraints, as the subcommittee felt this would have a detrimental

effect on the implementation of NextGen. Dr. Hansman stated that the recommendation needed to be articulated better; he suggested “R&D is part of a long-term strategy that is important to maintain.”

Subcommittee Report - Human Factors Subcommittee

Dr. Amy Pritchett (Subcommittee Chair) presented the findings and recommendations for the Human Factors Subcommittee. She explained that the members of the subcommittee were concerned with the deep cuts made to HF R&D funding year after year and by the fact that NextGen funding could not be relied upon to fill the gap. Mr. Hickey interjected that while the Subcommittee on Aircraft Safety (SAS) was not concerned with the levels of HF funding (both in the past and as projected), he himself was more apprehensive and shared some of Dr. Pritchett’s concerns. He explained that accident data seemed to continue pointing to HF as a major cause of aviation accidents. However, Mr. Hickey continued, he supported the current Aviation Safety (AVS) prioritization process. He invited the group and Dr. Pritchett to consider two points:

- 1) The HF community (sponsors and performers) was not currently doing a good job of defining what deliverable or end product was needed in a research project to address HF issues. Mr. Hickey stated that training for requirement writing had been organized to help HF people better state their needs, thereby increasing their chance of having a requirement ranked highly in the AVS prioritization process.
- 2) Other groups are already including HF aspects in their R&D efforts; however, it was difficult to quantify or see these HF aspects clearly across all groups.

Mr. Hickey assured Dr. Pritchett and the REDAC that the AVS team would be more mindful of incorporating HF concerns throughout the process. Dr. Pritchett added that it was important to study not only where HF caused accidents but also where they prevented accidents (and learn from those instances as well). Dr. Pritchett also appealed to the group to seek more transparency surrounding exactly how requirements were prioritized and rated through the annual AVS prioritization process. Mr. Fontaine added that Dr. Hickey’s point regarding the difficulty of showing the subcommittee all of the places where HF are embedded into FAA’s programs and policies was well taken.

Subcommittee Report - Aircraft Safety Subcommittee

Mr. Joe Del Balzo (Subcommittee Chair) presented the findings and recommendations for the Aircraft Safety Subcommittee (SAS). He began by stating that there were two parts of the FAA: the regulatory and the non-regulatory. The SAS supports the regulatory component of the agency and the model they use has been very thoroughly vetted and includes documented assumptions, etc. One overall area of concern for the SAS was their perception that the FAA lacked a sufficient level of technical expertise to ensure success. In terms of software and digital systems research, Mr. Del Balzo stated that it remained unclear to the subcommittee exactly how the FAA was updating its core research capability. Also, in terms of the aircraft icing research, the SAS was concerned about the FAA’s bench strength and stressed that the FAA should make

a priority of recruiting and hiring in-house experts in advance of the impending retirements in that department.

In response to the SAS's recommendation to expand the volcanic ash research program to identify acceptable tolerance levels, Mr. Hickey explained that the AVS has a zero tolerance policy for volcanic ash and that therefore a tolerance level could never be developed. He remained firm and said that their position on this matter would not change.

Committee Discussion

The members engaged in a discussion on what recommendations should be included in the letter to the Administrator. Dr. Hansman reviewed the key concerns below he wished to include in the letter (in order of importance to the REDAC). Attachment 3 provides the REDAC letter dated June 8, 2011, to the Administrator.

1) Strategic need to maintain critical research even in the face of current budget pressures

Dr. Hansman stated, that to the extent it can, the REDAC is willing to help in any way in the prioritization process (i.e., to provide advice on which programs could be cut vs. which should not be cut).

2) Concern about the coherence of a high-level NextGen research plan

Dr. Pritchett added a concern around the uncertainties created by NextGen for actual operators and their roles within the new framework. Dr. Hansman inquired whether that concern was more a Concept of Operation (ConOps) problem rather than something to be addressed by the research plan. COL Blackhurst answered that ConOps could drive the research plan. Dr. Hansman wondered if it might be premature to take a position on NextGen ConOps before getting the report that was supposed to come out soon on that subject. Some members agreed. Dr. Hansman suggested that Dr. Pritchett focus on this ConOps concern in her subcommittee's recommendation letter but stated that this topic should not be included in the full letter to the Administrator. He added that if those concerns still existed during the next REDAC review cycle, then they should be revisited at that time. Mr. Fontaine stated that he felt uneasy about the conversation as he was not sure the impending ConOps report and presentation would answer these HF concerns. Dr. Hansman stated again that issues relating to NextGen remained very vague.

3) Lack of core technical capability in research areas

Dr. Hansman stated that he was not sure if it would be appropriate for the REDAC to take an official position on the AIP appropriation debate.

The group then engaged in a discussion regarding the need for a NextGen research roadmap in order to show the potential cause and effect resulting from cutting NextGen programs due to budget constraints.

Further discussion centered around how difficult it was to account for HF in the AVS prioritization process since HF are not quantifiable and are not being advocated for like in some of the other groups within the FAA. Therefore, training HF requirement writers on how best to write requirements may not be enough; perhaps what was called for was a cultural change and for the reviewers in the AVS RE&D process to more actively consider HF concerns. It was agreed that there was room for improvement on both sides. A member suggested that in order for more HF requirements to be successfully adopted through the AVS prioritization process, the HF research would need to generate some kind of useful output or deliverable. Another member supported the idea of keeping HF concerns at the forefront by cautioning that if pilots continued not to be paid well, that position would then attract a different, less-skilled cohort of people which might create significant additional HF risks.

COL Blackhurst asked what the difference between modernization projects and NextGen projects was. He suggested that the REDAC advise the Administrator on specific projects that need to be shielded, protected, and/or nurtured. Mr. Fontaine admitted that the FAA is very project-oriented and that NextGen is really a portfolio of projects (which is difficult to come to grips with). He further stated that the FAA had come up with bounds for NextGen through segmented implementation plans (Alpha and Bravo). Mr. Fontaine agreed that it was difficult to get the whole FAA to wrap its mind around a program as complex as NextGen. Dr. Bussolari asked what the research needs were and were there questions in place to articulate these needs. Mr. Fontaine answered that this would be difficult that the FAA was working on it.

The group discussion then turned back to the public/private partnership issue. The following were some of the questions asked:

- 1) In terms of prioritization, had the FAA tried to bring certain things like alternative fuels and alternate concrete mixes out to the industry in an effort to have them subsidize or share in the cost of development of these things?
- 2) Had the FAA looked externally for grants that might be available to fund certain R&D programs?
- 3) Was there a member on the REDAC (serving as an outside advisor) who could point FAA Senior Management in the right direction to secure this external funding?

Members commented on the fact that commercial alternative fuels had initially been developed through a public/private partnership and how this initiative had been very successful. The overall consensus of the group was that these partnerships truly did work to stretch budgets and that the FAA should take advantage of them in this period of declining budgets. Mr. Fontaine shared with the group his view of an interesting paradox: sometimes when money started slowing down in the government arena, industry was forced to take a more collaborative and cost-sharing role in R&D rather than waiting for a lucrative contract from the government.

Attendance List

Members:

Dr. John Hansman - CHAIR (Massachusetts Institute of Technology)
Mr. Paul Fontaine - REDAC DESIGNATED FEDERAL OFFICIAL (FAA)
Dr. Steven Bussolari (MIT Lincoln Laboratory)
Mr. Edward Gervais (Boeing Commercial Airplane Company)
Mr. Chris Oswald (Airports Council International – North America)
Dr. Agam Sinha (MITRE/CAASD)
Mr. Joseph Del Balzo (JDA Aviation Technology Solutions)
Dr. Amy Pritchett (Georgia Institute of Technology)
Mr. Jack Blackhurst (USAF – Air Force Research Laboratory)
Mr. Steve Alterman (Cargo Airlines Association)

Other Attendees:

**Research, Engineering and Development Advisory Committee
Federal Aviation Administration (FAA)
800 Independence Avenue, SW Washington, DC - 10th Floor Round Room
April 20, 2011**

Agenda

9:00 am	Welcome	Paul Fontaine John Hansman
9:15 am	Update – Change Working Group	John Hansman
10:00 am	Remarks	Michael Huerta
10:30 am	Update – Budget	Mike Gallivan
11:00 am	Break	
11:15 am	Update – NavLean	John Hickey
11:45 am	Committee Discussion	John Hansman
12:00 noon	Lunch	

Subcommittee Reports

1:00 pm	NAS Operations	Steve Bussolari
1:15 pm	Airports	Ed Gervais
1:30 pm	Environment and Energy	Steve Alterman
1:45 pm	Human Factors	Amy Pritchett
2:00 pm	Aircraft Safety	Joe Del Balzo
2:15 pm	Committee Discussion	John Hansman
	- Recommendations	Paul Fontaine
	- Future Committee Activity	
3:00 pm	Adjourn	

June 8, 2011

The Honorable J. Randolph Babbitt
Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Administrator Babbitt:

On behalf of the Research, Engineering and Development Advisory Committee (REDAC), I am enclosing the summary findings and recommendations from the spring meetings of the standing REDAC Subcommittees (Aircraft Safety, NAS Operations, Environment and Energy, Airports, and Human Factors).

The full committee also made the following general observations:

Prioritization Within the Research & Development Portfolio – It is anticipated that the difficult federal budget environment will create pressure to reduce the funding of research and development within the agency. In this environment it will be important to take a strategic approach to evaluating research and development activities in order to prioritize those activities which are most critical to the agencies mission or to the staged implementation of NextGen. The REDAC offers its assistance if it can be helpful in this process.

Complexity of NextGen Research and Development Plans – The need to identify the high priority (critical path) research and development activities within NextGen highlights the need for a clear high level Research and Development plan that articulates the critical NextGen needs and links them to the R&D portfolio. The REDAC understands the challenge of defining such a plan for a complex system such as NextGen but has previously noted that the FAA plans and roadmaps do not articulate a high level vision and are so detailed and complex that they are intractable. This makes it difficult to evaluate if the necessary R&D is being accomplished, how R&D results will be used and which elements could be deferred to accommodate budget constraints. The REDAC reiterates its recommendation that a high level R&D plan be developed from the existing more detailed plans and enterprise architecture to articulate the R&D vision and identify the critical path of R&D for NextGen.

Concern on Level of Technical Expertise in Key Areas – As noted in prior recommendations the FAA has a unique need for expertise in key areas such as critical software and digital systems

and human factors both for certification and acquisition and it has been difficult to build and maintain the technical capabilities of the agency in these and other critical areas. The REDAC notes some limited progress (e.g. the reported hiring a chief scientific and technical advisor for software after a 5 year search) but *reiterates its now standing concern* that there has been inadequate progress in developing the core competency and technical workforce in this and other key areas. The REDAC recommends that a strategy be developed and executed to improve the ability of the FAA to compete in the market for highly desirable talent.

We hope that these observations are useful to you and the agency. The REDAC stands ready to assist if there is any way we can help in our common objectives of improving the safety, efficiency and capability of the air transportation system.

Sincerely,

R. John Hansman
Chair, FAA Research, Engineering and Development Advisory Committee

Enclosure

**Research, Engineering and Development (REDAC)
Subcommittee Recommendations on the FY 2013 R&D Portfolio**

Subcommittee on Airports

Finding: The Subcommittee is very concerned over potential actions to move the Airport Technology Research Program and the Airport Cooperative Research Program from the AIP appropriation into the R, E and D appropriation. Both programs have grown and matured with the resources and attention provided by the Office of Airports (ARP) and the AIP appropriation. It would be a setback to put these programs back into annual competition for R, E and D funding with the other Lines of Business.

Recommendation: The Subcommittee believes it is critical to maintain this successful management and funding approach and recommends that FAA continue to support these programs in the AIP appropriation. Should, however, that prove unsuccessful, the committee recommends that FAA take administrative action to assure that the Office of Airports is designated to provide primary management control of these two important airport research programs.

Finding: The Subcommittee would like to see more detailed milestone charts for projects instead of the standard “quad” funding charts.

Recommendation: The FAA should develop an example of an improved project tracking approach with milestones that will enable the Subcommittee to better understand the deliverables and project schedules. This should be briefed at the next Subcommittee meeting.

Subcommittee on Environment and Energy

Finding: One of the most promising areas of environmental research continues to be in the area of the development and certification of alternative aviation fuels. Such research will lead to reductions in emissions of CO₂ and air quality pollutants, and will promote energy security by reducing dependence on sources of foreign oil.

Recommendation: The ongoing CAAFI support and alternative fuels research effort must continue to be funded. At the present time, much of the alternative fuels research funding is included in the Agency’s NextGen Research Engineering and Development (RE&D) account, an account that is in jeopardy under current budget scenarios. Faced with this situation, the Subcommittee recommends continuing CAAFI support through the “Core Research and Development” fund category to ensure at least a measure of funding in this area in the event of any future budget cuts.

Finding: Continued Operational Research is necessary to support the implementation of NextGen initiatives.

Recommendation: In order to be able to implement NextGen initiatives, continued funding must be available for continued Operational Research. Such research leads to both increased efficiency and improvements in environmental performance. A recent example of the importance of this research is the so-called “N Control” surface movement research at Boston’s Logan Airport in which aircraft were selectively held at the gates to reduce time idling on taxiways as well as reduction in fuel burn and emissions. This initiative was hailed by everyone from airlines to air traffic controllers and may be ready for more general use in the near future. The Subcommittee recommends that such research activities, which lead to early implementation possibilities, be given a high priority in any necessary budget reductions.

Finding: In the area of technology research, the ongoing CLEEN program to develop new aircraft and engine types with better environmental profiles shows great promise. However, since this program is dependent on funding appropriated after 2008, the entire program would be in jeopardy if Congress cuts funding to 2008 levels.

Recommendation: The Subcommittee recognizes the funding threat to the CLEEN program, but recommends, even in a worst case scenario, that the CLEEN office within the Office of Environment and Energy be maintained to work with NASA on possible continuing projects and to be available should future increased funding return. While the implementation of CLEEN projects is relatively far off, completely abandoning the program will push technology-based environmental initiatives too far into the future.

Finding: United States leadership in the international community continues to be an important environmental priority, especially as the International Civil Aviation Organization (ICAO) debates the setting of a worldwide aircraft CO2 emissions standard.

Recommendation: The Subcommittee strongly recommends that funding necessary to support ICAO activities continue. More specifically, the Agency’s modeling activity (AEDT and APMT) should be supported to enable informed judgments to be made on all possible ICAO scenarios.

Finding: A few ongoing Environment and Energy projects should be given a relatively low priority and scaled back to permit continued activity in higher priority areas.

Recommendation: The Subcommittee recommends that work in the Aviation Climate Change Research Initiative (ACCRI), which concentrates on non-CO2 climate effects, be deferred until a more robust funding stream becomes available. Similarly, research initiatives related to leaded AvGas should be scaled back and noise research should focus on policy issues, with field surveys to determine annoyance levels deferred until more funding becomes available.

Finding: Current versions of the FAA Reauthorization Act provide that projects in the Airport Cooperative Research Project (ACRP) cannot be funded using AIP funds. If enacted, these provisions would require ACRP projects to be funded out of the core R&D pool of funds, thereby competing for funding with other, higher priority, items.

Recommendation: The Subcommittee recognized the problem of having ACRP projects compete with other funding priorities in the core RE&D pool. There was, however, no unanimity

on what action could be taken to address the issue. The Subcommittee did agree, however, that it is important for the FAA to be aware of this problem.

Subcommittee on Human Factors

Finding: The Human Factors Subcommittee was briefed on the Flight Deck and ATO Core and NextGen Human Factors programs. We found that their FY 2013 research portfolios and their underlying structure were appropriate to FAA's mission and covered the area of need as understood by the subcommittee, with the exception listed in the subsequent Finding. In particular, the Subcommittee was impressed that other entities within the FAA are actively coordinating with, or seeking human factors input from, specialists in human factors including the FAA Human Factors Research and Engineering Group (HFREG, AJP-61), especially related to NextGen activities. We were also pleased that technically-knowledgeable personnel have been recruited to support these efforts.

Recommendation: We recommend that the human factors community within FAA continue their work in the areas presented, and that the funding continue at (at least) current levels in both programs.

Finding: The Human Factors Subcommittee recently received a briefing on the AVS prioritization of research, and we applaud the efforts of AVS to provide a consistent method to prioritize critical R&D dollars. However, we were severely dismayed that the process results in a 90% reduction of FAA human factor core RE&D funding for contracts in FY13 relative to recent levels, far greater, for example, than the ~1.5% reduction of overall AVS funds from FY12 to FY13, and does not allow for the continuation of on-going research areas. This level of funding will effectively end research in critical areas that cannot leverage NextGen funding and research (e.g., research into human factors in maintenance, including fatigue risk management), and may have long-term effects on the maintenance of facilities such as those at the Civil Aerospace Medical Institute (CAMI). We are extremely concerned with the results of this prioritization effort and the negative trend of human factor R&D funding. Human factors remain a significant factor in the majority of aircraft accidents and incidents and is a priority in the FAA Flight Plan. In addition, external reviews of FAA Programs consistently support increased funding for human factors. Thus, this reduction is inconsistent with FAA's documented research priorities.

Recommendation (a): This subcommittee strongly recommends the FAA Associate Administrator for Aviation Safety (AVS-1) conduct a thorough review of the recent prioritization results relative to pressing safety concerns and strategic goals. The subcommittee also strongly recommends that the FAA reverse the negative trend in contract funding of core human factors R&D to instead establish a funding level that is appropriately balanced with the core funding needs for human factors R&D, particularly in areas that cannot leverage off NextGen research. To not do this, we believe, will jeopardize the safety of both current operations and future operations involving new technologies and operations with foreseeable human factors concerns.

Recommendation (b): Two changes should be made within the administration of the AVS prioritization process. (1) Increased transparency is recommended for how the research requirements initially established by all the TCRGs are evaluated and selected, so that the final prioritization of the requirements, and the metrics assigned to each research requirement, are clear and not perceived as arbitrary. Specifically, at a minimum the initial and final AVP ratings used to select amongst the research requirements recommended by the TCRGs should be provided, with additional feedback as to the basis for the ratings. This information should be provided for funded and unfunded requirements. (2) There have been wide swings in the prioritization of requirements compared to allocations of contract funding to some of the BLIs. Of note here, the funding level for flight deck human factors varies dramatically across Fiscal Years 2011, 2012 and 2013. The AVS prioritization process needs to ensure the stability in funding between fiscal years required to foster quality research, to prevent the unnecessary application of short-term research methods where longer-term evaluations are required, and to prevent unnecessarily complication of research planning and execution, and to examine the effect of between-year changes in upcoming research funding in terms of the impact on planned human factors research.

Finding: The Human Factors subcommittee was first briefed on the NextGen Weather Technology in the Cockpit in August 2010 at which point it was in the process of replanning in response to earlier recommendations made by other subcommittees. Since the August briefing, significant changes have additionally been made in senior personnel. Although the briefing provided in this cycle (March 2011) provided more detail about specific human factors research activities and interaction with the community, the overall recommendation made in Fall 2010 was not fully addressed: i.e., the vision, intended deliverables and anticipated customers are not consistently and clearly articulated, including the appropriate role of government in this area, and the project should be evaluated as to whether it has the appropriate level of resources and staffing.

Recommendation: The previous recommendation provided Fall 2010 remains open. *As in earlier recommendations, the Human Factors Subcommittee continues to strongly recommend to the Director of Research and Technology Development that the vision, intended deliverables and anticipated customers be clearly articulated. The role of government research in this area needs to be carefully examined, as should whether an isolated program called Weather Technology in the Cockpit is more appropriate than broader inclusion of weather concerns in other NextGen programs including the HFREG flight deck program. An expert review of the project is warranted. Following that, the project should be resourced and staffed appropriately to its goals and intended impact, as judged relative to budget cuts in other NextGen research areas.*

Finding: We were very pleased and impressed with the presentation given by Kathy Abbott regarding the recent multi-year study completed by the Performance Based Operation Advisory Rulemaking Committee/Commercial Aviation Safety Team (PARC/CAST) Flight Deck Automation Working Group. Many of the study findings discussed appear to have great importance and significant implications for several activities, including the design and functioning of flight deck automation and its use, pilot training, air carrier policies and operations, and system certification. Thus, we are concerned that this long promised report and its findings have not yet been distributed or made available to the larger aviation community.

Recommendation: We strongly recommend that the FAA compel the completion of the review process for the final report of this work and its findings, and disseminate the report to the international aviation community as quickly as possible to allow for timely response to its safety implications.

Subcommittee on Aircraft Safety

Finding: The Aircraft Safety Subcommittee recognizes that as the nation's air transportation system moves to NextGen, the demands for digital systems will continue to grow. The comprehensive deep dive presentation in Software and Digital Systems Safety (SDSS) found FAA to be responsive to previous subcommittee recommendations. While it is evident that FAA is pursuing and executing the needed R&D in this rapidly evolving area, the subcommittee remains concerned that FAA in-house capability lags behind the needs. Further, it remains unclear to SAS how the knowledge gained from this work will be applied to improve FAA's ability to support policy, regulation, and certification of new digital system designs.

Recommendation: The subcommittee recommends that at the next meeting (August 23-25) the FAA present its plan to further build and maintain a capability to manage the breadth of SDSS R&D activities, beginning with the investments in R&D and moving the various R&D products into support of certification. This plan should include a review of the technical and project management skills resident in FAA research personnel, the approach to leveraging outside capability to obtain missing skills, and FAA management's plan to maintain those skills. Second, it should include an overview of past and current SDSS research efforts, their requirements, relevant milestones, level of performance, results, and an outline of how the results will be used to support policy and certification. Third, the plan should lay out a roadmap for the management of potential R&D to support future needs in complex, digital systems.

Finding: The Aircraft Safety Subcommittee supports the research being performed in the area of Terminal Area Safety and finds it is well structured and relevant. The stall recovery training research is progressing well with clear recognition of the degree of difficulty in accurately simulating this little explored and data lean flight regime. The subcommittee would like to see action taken to assure very close coordination between this research and that of the Flight Control Mechanical Systems area as synergy opportunities exist. The runway friction research aimed at reducing runway excursions needs to be complemented with continued research into how to prevent other causes of excursions such as unstable approaches. Performance Based Navigation (PBN) research is progressing well in a critical area with more to be done.

Recommendation: The subcommittee recommends that future PBN research include analysis of the performance improvements of NextGen satellite-based navigation solutions (e.g., RNP, SBAS, GBAS) over classic navigation sensors (e.g., ILS). This analysis, which should include RNP to GBAS approach and landing operations, should result in data that can be applied to regulatory criteria that establish operational advantages (e.g., lower landing minima) for these NextGen capabilities.

Finding: The Aircraft Safety Subcommittee is pleased to note that FAA has taken steps to establish a Volcanic Ash research approach to better define the operational requirements for the reporting and forecasting of volcanic eruptions which in turn would support the establishment of international guidance for operations in the vicinity of volcanic ash.

Recommendation: The subcommittee again recommends that the Volcanic Ash Research Program be expanded to include the identification of ash tolerance levels for aircraft, engines, and passengers.

Finding: The Aircraft Safety Subcommittee notes the steady funding decline in the Flightdeck/Maintenance/System Integration Human Factors (HF) research program. The Subcommittee understands that the decline in funding is due to the relatively low ranking of the sponsor requirements during the prioritization process. As explained, many of the requirements lacked sufficient detail to clearly establish the sponsor need, outcome, implementation plan, schedule, and other supporting information. The Subcommittee discussed whether or not the AVS Prioritization Process was somehow defective or otherwise contributed to this result. It was concluded that the Process is effective and did not inadvertently contribute to the low ranking of the requirements. The Subcommittee understands that it is likely that the final portfolio will include additional funding for two other requirements on maintenance fatigue and ADS-B human factors research, which would increase total funding to approximately \$900,000. Furthermore, the Subcommittee understands that AVS is aware of the this situation, will thoroughly review the aviation safety human factors research needs, and ensure that the FY 2014 human factor requirements have the necessary detail. AVS has committed to review the status of these actions during the human factors deep dive presentation scheduled for the summer meeting on Aug. 23-25. The Subcommittee finds that these steps are appropriate and has no recommendation regarding the HF program at this time.

Finding: The Aircraft Safety Subcommittee is encouraged by the efforts of the FAA to continually improve the aviation safety portfolio development process. To optimize the allocation of a limited R,E&D budget, AVS has improved the process by which safety research requirements are defined and prioritized. The Subcommittee makes favorable note of the use of committed, multi-year funding for a portion of the portfolio and very strongly endorses the stated AVS commitment to require regular reporting of research progress against a well documented deliverables plan. This approach will greatly assist AVS in deciding, annually, whether to continue to fund, redirect, or cancel the multi-year research efforts.

Finding: The Aircraft Safety Subcommittee is pleased to note that the Weather Technology In the Cockpit (WTIC) research deliverables are to be progressively released to enable timely industry response and the subcommittee looks forward to seeing an updated WTIC program schedule.

Finding: The icing program continues to have several high priority programs with limited in-house expertise that rely heavily on partners and grantees/contractors for program management. Although recruitment has not been successful, the SAS commends FAA's efforts to add a research meteorologist and aerodynamicist to the research team and notes the importance of continued FAA support to strengthen the in-house capability. **Action:** The Aircraft Safety

Subcommittee requests that progress in this area be reported during the Fall 2011 review of the Icing Program.

Finding: The filling of the recently created position of Chief Scientific and Technical Advisor for Vulnerability Discovery and Safety Management Programs is a good first step in ensuring that the ASIAs Program continues to be a safety tool to identify emerging risks before they become potential safety issues.

Finding: The Aircraft Safety Subcommittee remains encouraged by the work being done on Aircraft Catastrophic Failure Prevention. The work being done is highly relevant and continues to enjoy strong industry support. The Subcommittee suggests this research group re-examine fleet safety data to identify the remaining propulsion safety issues deserving of their attention.

Finding: The Fire Research and Safety Program continue to be relevant, well managed and directly responsive to current and emerging requirements.

Finding: Center of Excellence for General Aviation Research (CGAR) continues to be an example of how cost sharing arrangements, complemented by competent management and leadership, can be an effective way to conduct relevant research and advance the knowledge of FAA staff.

Finding: The prioritization process of research proposals has resulted in a substantial decrease in funding for the Aircraft Cabin Environment Research (ACER) Center of Excellence. The Aircraft Safety Subcommittee noted the success that FAA has had in obtaining industry collaboration for the development and upgrading of NextGen research laboratories and test beds. If the FAA believes that the ACER Center of Excellence will be needed to support future, not yet identified, research and operational requirements, the Subcommittee suggests that the possibility of obtaining increased industry support be explored.

Finding: Advanced Materials/Structural Safety (Includes Advanced NDI Methods for Composite Structures) The Aircraft Safety Subcommittee again finds that the FAA with a very small but clearly expert core staff, continues to leverage the work and expertise of other government agencies and the industry on critical safety issues. The focus on developing standards and guidance based on theory and practical experience, and the emphasis on providing usable guidance to FAA staff and others makes this a valuable example of how to do things right. The Subcommittee again recognizes that staying ahead of the composite aircraft fleet is critical to ensuring future continued operational safety and the SAS endorses the proactive approach to composite structure maintenance and inspection.

Finding: The Subcommittee agrees that the two tasks proposed to address Loss of Control (LoC) accidents are of high priority and should be pursued. The Subcommittee is also aware that requirements are still being defined outside of the FAA within joint government/industry activities such as the Low Speed Alerting Advisory Rulemaking Committee. Consequently, the Subcommittee is concerned that the current proposed funding may not be at levels to effectively address requirements forthcoming from the government/industry subject matter experts who are currently studying the issue of LoC. In addition the Subcommittee feels that better collaboration

with the aircraft manufactures will be needed as the FAA studies methods to address stall departure identification, recognition, and recovery technologies.

Recommendation: The FAA AVS sponsors for the Flight Control Mechanical Systems should work to ensure close coordination with other ongoing activities such as the Low Speed Alerting ARC to ensure their findings and recommendations are factored into the next fiscal year funding cycle.

Finding: The FAA continues to work on providing better guidance for maintenance credit determinations for rotorcraft within the current advisory circular. **Action:** The Aircraft Safety Subcommittee requests that a roadmap and schedule of Health and Usage Monitory System (HUMS) deliverables be included for review at the Fall 2011 meeting.

Finding: The Aircraft Safety Subcommittee believes that rapidly transitioning research results into guidance and regulatory material to support ongoing certification of advanced rotorcraft (BA 609 and S92F) should be given higher priority over required follow-on research activities.

Action: The Subcommittee requests FAA to include a schedule of early Fly by Wire/Fly by Light deliverables along with a timetable for issuance of certification guidance material, for review at the meeting on August 23-25.

Finding: The Structural Integrity Metallic project was found to be a well defined and through research activity leading to improved regulations and standards. This project is a good example of self funding through industry cost sharing and engineering support.

Finding: The Electrical System research project is in line with where the industry is going and supports the need for FAA to have informed regulators.

Finding: The Aircraft Safety Subcommittee was pleased to note that FAA agreed to review Unmanned Aircraft Systems Research (UAS) research requirements and the research plan in an attempt to match the integration timeline to the needs of the UAS community and looks forward to reviewing progress made and revised milestones in the update of the notional UAS-NAS integration roadmap. **Action:** The Subcommittee requests that FAA include the revised roadmap for review at the meeting on August 23-25.

NAS Operations Subcommittee

Finding: After the September meeting, the REDAC observed that there does not appear to be a clear high-level R&D plan for NextGen, and NASOPS specifically recommended the FAA clarify research priorities for the REDAC briefings using a framework based on the FAA's Solution Set taxonomy. The FAA's response letter indicated that "the Office of Research and Technology Development (AJP-6) and the NextGen I&I Office will work together to identify the best approach to articulate the NextGen research and development activities using the plans and roadmaps that have been developed." This NASOPS meeting was a good first step in this direction. The subcommittee received a briefing from Paul Fontaine on the Acquisition Management System (AMS) and the role of RE&D in the Concept and Requirements Definition

stage. We were pleased, also, to receive a briefing from Michelle Merkle stating that the updated mid-term NextGen Conops was to be issued this spring, and that concept development and validation guidelines have been developed for AMS that will be used to assess each service as to its maturity and readiness to move toward a final investment decision within AMS. Since the FAA will be using these guidelines to perform its own assessment as part of AMS, presenting the results to the subcommittee should impose a minimal burden.

Recommendation: The Subcommittee recommends that the FAA continue to emphasize and effect internal coordination between AJP-6 and I&I in order to provide an information exchange with NASOPS of all R&D in selected focus areas up to at least the Initial Investment Decision in the AMS. Additionally, NASOPS will review the updated NextGen Conops when it becomes available, and recommends that the FAA present its assessment of the status of NextGen RE&D in the selected focus areas relative to the concept development and validation guidelines that it has developed for the AMS. This will enable the subcommittee to assist the FAA with advancing its RE&D portfolio by making specific recommendations.

Finding: Michele Merkle again provided excellent presentations on NextGen Solution Set Ops Concept Development and Validation. The members once again found the presentations and the work itself to be exemplary of the research and development so essential to the success of the FAA NextGen effort. Michele's Separation Management presentation for High Altitude included the following critical attributes: a clear focus on the potential benefits of the research, a willingness to face the difficult but necessary effect of the research on both pilot and controller roles, and avoidance of overinvestment in a full SRMD for a concept when a preliminary safety analysis was all that was required at an early stage.

Recommendation: The Subcommittee continues to see the Ops Concept research as exemplary in nature and the work itself as critically important, and quite possibly underfunded. We recommend that the FAA continue to ensure funding for these activities.

Finding: The Subcommittee has recommended in the past that the FAA work to define the role of public-private partnerships (PPPs) in accelerating NextGen deployment. The history of successful PPPs in accelerating the maturation and deployment of innovations in the marketplace is rich with examples of relevance to the challenge the nation faces in NextGen. The FAA has made sporadic use of one-on-one government-industry partnerships, for example, the JetBlue, USAIR, and related projects. However, these projects do not represent the opportunity for industry-wide acceleration of NextGen capabilities through PPPs. The SE2020 contracts may offer a first opportunity in this regard.

Recommendation: The Subcommittee strongly encourages the FAA to conduct a rigorous evaluation of the opportunity for NextGen acceleration through PPPs. The Subcommittee volunteers to form a working group in support of the FAA's exploration of these opportunities and to provide the FAA with lessons learned in the design and operation of PPPs.

Finding: Programs in the FAA NextGen implementation portfolio that are reviewed by NASOPS frequently contain transformational goals that may face resistance or opposition from FAA employees, including but not limited to controllers. A specific example from this meeting

is the Staffed NextGen Tower – Small and Medium Airport (SNT-SMA) phase. It appears to the committee that the inhibited dialogue between the controller workforce and the NextGen program leaders significantly limits the valid exploration of such advanced concepts for improvements in operational efficiencies, safety, and cost.

Recommendation: In situations where the research goals have confronted employee organizations’ concerns, these concerns should be included in the Subcommittee review process. Recommendations to the Administrator and the Congress on NextGen implementation by REDAC should account for such concerns.

Finding: NextGen capabilities, and the benefits associated with them, will not be realizable if strategies to implement them do not address transition and mixed equipage considerations. Few capabilities requiring flight operator equipage or other investment can provide a solid economic justification for the creation of exclusionary airspace. Transition and adoption periods span multiple years, resulting in a mixed equipage environment that must be dealt with both from the ANSP and the flight operator perspective. Flight operators are not willing to serve as “early adopters” of capabilities requiring avionics or other investments if there is a significant delay in achieving benefits until achieving a high-level of equipage. FAA concept exploration has begun to address this issue through the re-examination of assumptions for equipage in validating operational suitability and through the consideration of “best-equipped, best served” policies for some NextGen capabilities.

Recommendations:

- a. FAA should evaluate current NextGen concept and procedure definition and validation efforts to ensure that extended, multi-year mixed equipage scenarios are both operationally feasible as well as attractive to flight operators that make investments in advanced NextGen capabilities. In particular, concepts need to ensure that benefits to operators with higher levels of equipage are proportionally higher than those accrued to operators with less capability. Concepts and procedures should not unintentionally disadvantage equipped flights or operators due to greater difficulty in managing lesser-equipped traffic.
- b. As part of the concept validation of capabilities requiring avionics not currently available, FAA should work with its customers to better reflect customer perspectives on the business case, quantify the differential benefits of equipage, and assess whether these benefits are sufficient to justify operator investments.

Finding: The briefing by Joe Post on the FAA’s System-Wide Airspace Concepts (SWAC) model was very good. The progress by the FAA in implementing the modeling capability needed to evaluate mid-term NextGen capabilities appears quite good. However, it is not clear that FAA decision-makers use SWAC broadly in an *a priori* fashion to inform their investment decisions by performing relatively rapid cost-benefit tradeoff analyses of new technologies or capabilities, as opposed to *a posteriori* studies to justify assumptions, and could be scaled up to make better use of this important quantitative tool.

Recommendation: The FAA should embrace the use of SWAC and its continuing improvements for informing prioritization of investments within NextGen implementation plans. The FAA should increase its use of SWAC as part of the suite of tools that it uses to generate a quantitative underpinning for the NextGen benefits story.

Finding: The NextGen Weather Operations briefing was the best aviation weather briefing the committee has received. The connection between source weather data associated with the National Weather Service 4 Dimensional Cube, and FAA systems NWP, NNEW, and the provision of source data for CoSPA from the Cube were evidence of the excellent connection between research and the NextGen operations concept. The primary graphic showing connections from base forecasting and observational data, through the cube, to FAA distribution systems, and to FAA and AOC operators was also excellent. Finally, the committee found that the part of the briefing associated with CoSPA (the new NextGen Storm Forecasting Product) was excellent. Member John McCarthy felt that this product was the best produced by FAA research-to-applications effort since the days of the microburst warning system.

Recommendation: The Subcommittee recommends carrying on the excellent progress of this program as currently constituted. The FAA should ensure that the NOAA and NWS observation and forecast community remain fully involved in FAA atmospheric forecast and modeling efforts, and that where appropriate, these be operationally implemented at the National Weather Service, and have the results provided on the NWS 4 D-Cube.

Finding: The briefing on the Weather-Technology-in-the-Cockpit (WTIC) activity was the third in two years to NASOPS. Earlier briefings of WTIC did not articulate a clear set of objectives or a connection to NextGen requirements and the Subcommittee recommended that the FAA correct this shortfall. A critical part of NextGen is the establishment of a Common Operating Picture (COP), which is shared by pilots, controllers, AT managers, and AOC dispatchers. Weather information is clearly part of this COP and the FAA has the objective to ensure that pilots have access to weather information in the cockpit to achieve NextGen safety and efficiency objectives. The most recent presentation demonstrated a greater understanding of issues that need to be addressed with respect to WTIC and a Common Operating Picture (COP) among controllers, TFM personnel, dispatchers, and pilots.

Recommendations:

- a. For WTIC to evolve in a credible manner, the project needs to clarify just what the NextGen objectives are that it is attempting to meet. Specifically, if the objective of WTIC is to establish the essential cockpit weather information required to achieve NextGen Operational Improvements, the Subcommittee recommends that the FAA show that a cost-effective methodology is being undertaken to identify them. On this basis, the developing WTIC effort should be evaluated to see whether it is cost effective to continue with this program relative to other key needs for NextGen research.
- b. As part of the evaluation process, the Subcommittee recommends that the FAA consider any specific cockpit weather information requirements to support NextGen

Trajectory Based Operations. Additionally, the Subcommittee recommends that the WTIC consider the impact of weather in the cockpit on pilot training requirements, particularly in the General Aviation environment.

Findings: FAA and NOAA are evaluating MPAR as a possible future replacement for primary surveillance and weather radars. FAA's interest is relative to airport surveillance radars (ASR-8, 9 and 11) and Terminal Doppler Weather Radar (TDWR), while NOAA is evaluating MPAR as a potential replacement for the WSR-88D (NEXRAD).

MPAR offers the possibility of reduced cost-of-ownership for future US national primary radar networks. In addition MPAR may result in enhanced mission performance capabilities for multiple US Government agencies. Capability enhancements include non-cooperative aircraft height measurement, wind turbine clutter mitigation and more rapid volumetric scanning of severe weather. To fully realize these benefits, FAA, NOAA, DoD and DHS must coordinate the development of MPAR technical requirements and must develop joint concepts of operation and synchronized investment decisions. There appears to be good coordination between FAA and NOAA. DoD and DHS, however, have not been effectively engaged in MPAR research.

Recommendations:

- a. The FAA should establish a coordinated MPAR research program with other agencies including NOAA, DoD and DHS. This activity should develop integrated technical requirements, complementary research investments and a synchronized schedule for investment decisions. The Joint Planning and Development Office (JPDO) would appear to be an appropriate entity to lead this coordination process, but other governances are possible.
- b. The FAA should continue its MPAR research in order to clearly substantiate technical viability and a positive cost-benefit prior to its 2016 Initial Investment Decision milestone. The objectives and expected outcomes of the FAA's MPAR research program should be clearly articulated and the agency should identify key issues that are not being addressed owing to resource limitations. In particular, the FAA should show how its research plan meshes with that of partner agencies (currently NOAA) to address the full spectrum of MPAR implementation issues including technology, concept of operations and system level architecture.

Finding: The NAS Operations Subcommittee was pleased to see the extent to which FAA is funding research into Human Factors, as evidenced by the FAA's thorough overview of Human Factors work sponsored through the RE&D budget line item. This work appears to cover a wide range of activities. The NAS Ops subcommittee was not able to determine from the briefings the relative importance of the tasks presented, nor how these specific tasks were tied to key NextGen needs.

Recommendation: FAA should integrate human factors research with overall concept validation efforts, rather than planning these as separate activities. In addition, FAA should

better articulate and provide relative criticality information regarding the underlying shortfalls or risks associated with specific human factors research tasks.

Finding: The briefing on the Joint Planning and Development Office (JPDO) status left the Subcommittee concerned about its current role and future contribution to NextGen. Because of the new alignment of the office, it appears that an assessment of scope, strategic approach, and connection to the FAA should be conducted.

Recommendation: NAS Ops requests a briefing from the JPDO Director and/or Deputy Director at the next meeting addressing JPDO future objectives, plans and priorities, and how the office connects to the FAA, other government agencies such as NASA and industry stakeholders, especially in the research arena.

Finding: The budget briefing by Mike Gallivan was exemplary for its inclusion of budget lines for all NextGen related work, including the Solution Sets, but no detailed information for FY13 and on was available for this meeting. NAS Ops appreciates Mike's commitment to getting the information to us when it is available.